

True reduplication of the second sound of the heart is produced by asynchronous tension of the two sets of sigmoid valves.

The phenomenon is a normal one, the aortic valve tension preceding the pulmonary at the end of inspiration and beginning of expiration.

The splitting of the second sound may be wholly absent or only perceptible at about the end of inspiration, or reduplication may be represented by a double sound throughout the respiratory cycle.

The widest reduplication of the second sound occurs when the ventricles are asynchronous in action. When the right ventricle slightly precedes the left the second sound is single, and, conversely, when the second sound is single the contraction of the ventricles is usually asynchronous.

When the first sound is single the character of the second sound as regards reduplication depends upon the ratio of pulmonic to systemic arterial blood-pressure. The greater the difference between these pressures the more marked the reduplication, and *vice versa*. Therefore, when the lung vessels are congested or resistance to outflow from them is increased, reduplication of the second sound is diminished or absent. At the beginning of fevers a single second accompanied by a double first sound has been found; the reverse condition follows as convalescence is reached.

True reduplication of the second sound is heard most plainly at the base of the heart under the second and third left costal cartilages bordering upon the sternum.

Position of the body and especially respiratory movement influence reduplication of the second sound, in so far as they influence the ratio of pulmonic to systemic arterial pressure.

There is reason to believe that the maximum difference between aortic and pulmonary arterial pressures is rhythmically reached at the end of inspiration and the beginning of expiration—that is, in the phase of respiration in which the splitting of the second sound is most marked.

We are probably now in possession of sufficient physiological data to make the estimate of the conditions involving reduplication of the heart-sounds of considerable clinical value.

A CASE OF TUBERCULOSIS OF THE BREAST,
WITH AN ANALYSIS OF ALL CASES OF TUBERCULOSIS OF THE BREAST
RECORDED IN MEDICAL LITERATURE.

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AMONG the fifty cases of tumor of the breast which came to my clinic at the Massachusetts General Hospital, Surgical Out-patient Department, during the last service, there appeared :

Mrs. Y., an Italian, aged forty-three years. She has had seven children. The eldest child is twenty-five, the youngest child is three years. She has always had fairly good health, and remembers no personal illness. Five years ago there was a painful swelling in the left breast, which was opened about one year later. Three years ago, when nursing her last child, there was a return of pain, and a swelling appeared, which was opened. She complains now of pain and persistently discharging sinuses in the breast. Her chief complaint is constant pain.

The physical examination finds a mitral murmur at the apex of the heart. The left breast presents several cicatrices about the edge of the areola, in which cicatrices are seen the openings of sinuses discharging a dirty-white material. No milk comes from the breast. There is felt a small, tender, fluctuating area the size of a large bean near the areola, and there are also areas of induration about the sinuses. The remainder of the breast-tissue feels normal. One or two axillary glands are felt upon this side.

A diagnosis of tuberculosis of the breast was made from the clinical picture, and she was referred to the hospital, where Dr. John Homans, into whose service she went, operated, removing the portion of the breast involved.

The following is the microscopical report of the Pathologist to the hospital:

PATHOLOGICAL LABORATORY,
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Areas made up of epithelial cells, with here and there giant-cells, and marked infiltration with polynuclear leucocytes. The areas are seen in process of breaking down. Tuberculosis.

J. H. WRIGHT, M.D.

There is no organ or tissue in the body which is free from the ravages of tubercular disease. Even the mammary gland is occasionally the seat of tuberculosis.

Anatomical and bacteriological evidence must determine whether any case under consideration is one of tuberculosis or not.

It is upon this basis that the cases reported have been judged and have been accepted or rejected as tubercular.

The microscopical evidences of tuberculosis are the finding of either the tubercle bacilli or the anatomical tubercle, or both together, in the diseased tissues or in the discharges from these tissues through a fistulous opening or through the nipple. To determine that a given case is one of primary or secondary infection, through either metastasis or contiguity of tissue, is far more difficult and in many instances is well-nigh impossible, without a complete autopsy.

Many cases of chronic mastitis, chronic abscess of the breast, mammary fistulæ, and scrofulous tumor, so-called, are the results of tubercular infection. Cases have been reported which clinically were tubercular, but in the absence of positive evidence they have been rejected.

A very careful search of medical literature finds, including the case

above reported, but 80 instances recorded as tuberculosis of the breast. Twenty-three of the 80 cases are lacking in positive anatomical and bacteriological evidence and are not to be regarded strictly as tubercular.

Four of the 80 cases are *distinctly secondary*, viz.:

- Case 9 (Mandry) was secondary to ostitis of the rib.
- Case 12 (Mandry) was secondary to axillary glandular enlargement.
- Case 18 (Müller) was secondary to axillary glandular enlargement.
- Case 25 (Gaudier and Peraire) was secondary to caries of the sternum.

These four and the remaining fifty-three cases are the only reported instances of tuberculosis of the breast in medical literature...

A list of these cases and the surgeons reporting them, together with the references to literature, are here given.

Fifty-three Cases of Tuberculosis of the Breast.

- Case 1. Rémy et Noel. *Bulletin de la Soc. anatomique*, June 1893, p. 412.
- Case 2. Walther et Pilliet. *Bull. de la Soc. anatomique*, April, 1895, p. 312.
- Case 3. Powers. *Annals of Surgery*, 1894, p. 159.
- Case 4. Powers. *Annals of Surgery*, 1897, p. 86.
- Case 5. Villar. *Gazette des Hôpitaux*, 1894, p. 606.
- Case 6. Le Dentu. *Revue de Chirurgie*, 1881, tome i, p. 27.
- Case 7. Lotheissen. *Wiener klinische Wochenschrift*, 1897, No. 34, p. 763.
- Case 8. Mandry (Habermaas). *Beiträge zur klinischen Chirurgie*, 1891-2, vol. viii. p. 179.
- Cases 10, 11, 13, and 14. Mandry. *Ibid.*
- Case 20. Poirier. *Thèse de Paris*, 1883.
- Case 21. Hebb. *Trans. Patholog. Soc.*, vol. xlv. p. 123. London.
- Case 22. Schede. *Deutsche medicinische Wochenschrift*, 1893, p. 1316.
- Case 24. Reerink. *Beiträge zur klinischen Chirurgie*, 1895, vol. xiii. p. 49.
- Case 27. Gaudier and Peraire. 1st and 3d Case. *Ibid.*
- Case 28. Sabrazes and Binaud. *Archives de Médecine experim.*, 1894, No. 6, p. 838.
- Case 29. Demme. Schmidt quotes from 26th Bericht über die Thätigkeit des Jennerschen Spitals. Bern, 1889.
- Case 30. Ugo Pisani. *Policlinico*, 1896, vol. iii. No. 23, p. 594.
- Cases 33 and 35, Bender, 1st and 3d. *Beiträge zur kl. Chirurgie*, 1891-2, vol. viii. S. 205.
- Case 36. Habermaas. *Beiträge zur kl. Chirurgie*, 1886, Bd. ii. (quoted by Bartels).
- Case 39. Johannet. *Revue Médico-chirurgicale*, tome xiii., 1853.
- Case 42. Richet. *Gazette des Hôpitaux*, No. 55.
- Case 43. Duret. *Le Progrès Médical*. Paris, 1882, No. 9.
- Case 47. Dubar. *Des Tubercules de la mamelle*. Thèse. Paris, 1881.
- Cases 48 and 49. Ohnacker. *Archiv für klin. Chirurg.*, Bd. 28.
- Cases 50 and 51. Orthman. *Virch. Archiv*, Bd. 100.
- Case 52. Kramer. *Centralb. für Chirurg.*, vol. xv. Zeit. p. 867.
- Cases 53 and 54. Piskacek, 1st and 2d. *Med. Jahrbücher*. Wien, 1887, S. A.
- Case 59. Piskacek, 7th. *Wien. med. Jahrbücher*, 1887, Bd. 10.
- Cases 62 and 65. Berchtold. *Ueber Mammatuberkulose*, 1880. Uster, quoted by Mandry.
- Case 66. Berchtold. *Ueber Mammatuberkulose*, 1890. Uster.
- Case 68. Hering. *Inaugural Dissertat.* Erlangen, 1889. Mandry.
- Cases 69 and 70. Roux. *De la Tuberculose Mammaire*. Genève, 1891.
- Cases 71 and 72. Dubreuil. *Gazette Médicale*, April 28, 1888.

- Case 73. Shattock. *Trans. Path. Society*. London, 1889, vol. xl. p. 391.
 Case 74. Souplet. *Bulletin Société Anatomique*. Paris, 1886.
 Cases 75 and 76. Reverdin. Quoted by Bartels, without reference.
 Case 78. Bartels. *Inaug. Dissert.* Marburg, 1892.
 Case 79. Ely. *Proceedings of New York Path. Soc.*, 1891, p. 81. (Quoted by Powers.)
 Case 80. Scudder. Writer's case here reported.
 Case 81. Dubar. *Des Tubercules de la mamelle*. Thèse. Paris, 1881.
 Case 82. Davis. *Medical News*, Philadelphia, June 12, 1897.
 Case 83. Davis. *Ibid.*

The references to the four cases of evident secondary tuberculosis of the breast are:

- Case 9. Mandry (Habermas). *Beiträge zur klinischen Chirurgie*, 1891-2, vol. viii. p. 179.
 Case 12. Mandry. *Ibid.*
 Case 18. Müller, Ludwig. *Inaugural Dissertation*. Würzburg, 1893.
 Case 25. Gaudier et Peraire. *Revue de Chirurgie*, 1895, vol. xv. p. 768. A fourth case.

There were 23 cases reported as tuberculosis of the breast which were rejected because of insufficient proof. A list of these rejected cases follows:

- Cases 15 and 16. Billroth. *Deutsche Chirurgie*, Billroth u. Lücke, published 1880. (Quoted by Le Dentu, *Rev. de Chir.*, 1881, p. 27.)
 Case 17. Park. *Medical News*, vol. lxix. 1896, p. 524.
 Case 19. Horteloup. *Tumeurs du Sein chez l'homme*. Paris, 1892. (Quoted by Poirier, Thèse de Paris, 1883.)
 Case 23. Schede. *Deutsche medicinische Wochenschrift*, 1893, p. 1316.
 Case 31. Lane. *British Medical Journal*, 1890, vol. ii. p. 630.
 Case 32. Lane. *Transactions of Clinical Soc.*, 1892, vol. xxv. p. 243.
 Case 34. Bender. *Beiträge zur kl. Chirurgie*, 1891-92, vol. viii. S. 205.
 Cases 37 and 38. Velpeau. *Maladies du Sein*, 1854, cited by Bartels.
 Case 40. Heyfelder. *Deutsche Klinik*, 1851, No. 48.
 Case 41. Richet. *Gazette des Hôpitaux*, No. 55.
 Case 44. Duret by Lotheissen. *Le Progrès Médical*. Paris, 1882, No. 9.
 Case 45. Duret, same with Case 43. *Le Progrès Médical*. Paris, 1882, No. 9.
 Case 46. Duret, same with Case 44. *Le Progrès Médical*. Paris, 1882, No. 9.
 Case 55. Piscacek. *Wien. med. Jahrbücher*, 1887, Bd. 10.
 Cases 56, 57, 58, and 60. Piscacek. *Wien. med. Jahrbücher*, 1887, Bd. 10.
 Cases 61, 63, 64. Berchtold. *Ueber Mammatuberkulose*, 1890. Uster, Bartels.
 Case 67. Hebb. *Trans. of Patholog. Society*, 1888. London.
 Case 77. Kummer, quoted by Bartels. *Inaug. Diss.* Marburg, 1892. No reference given.

It is necessary to make brief mention of the 23 rejected cases. In the sputum of several cases of Piscacek, namely, Cases 55, 56, and 58, tubercle bacilli were found. The individuals had tuberculosis of the lungs and presented, clinically, tubercular lesions in the breast. It would be highly improbable that in manifestly tubercular subjects, in whose sputa tubercle bacilli were found, lesions in the mammary gland clinically resembling those of tuberculosis should be any other than tubercular.

Billroth, two cases: one, Case 15, presented multiple cheesy nodules which healed after incision and cauterization; the second, Case 16, presenting nodules in the breast, some of which contained cheesy material, died of tuberculosis.

Horteloup's case (19) presented a flattened tumor about the nipple, with tuberculosis of the lungs and of the epididymis.

Schede's second case (23) was a pathological specimen, incompletely recorded; no history was reported.

Of Lane's two cases, one (Case 31) showed abscesses in the breast and caseous lymphatic glands; the other (Case 32), in a phthisical subject, presented a breast abscess.

Bender's case (34), in a phthisical subject, showed both breasts involved with a hard tumor fluctuating in one spot and with enlarged axillary glands.

Velpeau's two cases (37 and 38) presented hard, lumpy feeling masses, one fluctuating, the other having fistulæ.

Heyfelder's case (40) was that of a large abscess near and overlapping the region of the breast, acute in its course.

Richet's case (41), in a phthisical subject, was a cold abscess in the breast with enlarged axillary glands.

Duret's case (44), reported by Lotheisen, is probably the same as Case 46, in which there was an axillary swelling the size of a small apple, tender and movable, together with cheesy glands.

Duret's case (45) is the duplicate of Case 43, which is accepted.

Piskacek's case (55) is a phthisical subject in whose sputum tubercle bacilli were found. The left breast was atrophic, very little glandular tissue was present. There were scars in the skin of old fistulæ, and there were existing fistulæ. There was an ulcer near the nipple, with violet-colored edges. Clinically, this would seem to be a very satisfactory case.

Piskacek's case (57) exhibited fistulæ following a mastitis, and Case 60 exhibited a hard swelling of the right breast; softening in places, an ulcer of the skin and fistulæ.

Berchtold's case (61) was an individual presenting glands in the neck and multiple hard nodes in the breast, which had softened, discharged, and healed.

Berchtold's case (63) was a girl, aged fifteen years, who had had no catamenial period. A fluctuating swelling the size of a fist was opened and curetted.

Berchtold's case (64) was an individual with phthisis and an old pleurisy, who had a hard, tender swelling in the right breast and an axillary abscess in the right axilla.

Hebb's case (67) was a woman, aged thirty-nine years, who had had hæmoptysis. She had had eight children, five of whom had died of

consumption. She presented a hard, movable tumor in the breast, and the lymphatics were enlarged to the axilla.

Kummer's case (77) was a child, aged sixteen years, with an axillary swelling extending toward the breast. An abscess had opened under the nipple. The sinus healed. Other abscesses opened. Fistulæ were present. The axillary glands were enlarged.

METHODS OF INFECTION. In primary mammary tuberculosis the tubercle bacillus must find its way into the organ through the milk-ducts or through an open wound of the nipple, as in Case 29 (Demme), or of the skin over the breast. If the primary infection is through the milk-ducts, the glandular acini will be first involved; if infection be through the wound of the skin, the interstitial tissue is first attacked.

Metastatic mammary tuberculosis or autoinfection, in which the infectious agent obtains access to the breast through the vascular channels from a tubercular focus situated in some distant portion of the body, is the most common form.

As a secondary disease through contiguity of structure, tuberculosis of the breast may follow caries of the rib or sternum, empyema of the chest, and tuberculosis of the axillary and neighboring lymphatic glands.

HEREDITARY INFLUENCES. Tuberculosis is not hereditary, but there still exists a well-founded notion based upon experience that a lack of resistance in the tissues to tuberculous infection is inherited.

Case 4 (Powers) had two sisters and a brother who died of phthisis. Case 10 (Mandry) and Case 28 (Sabrazes and Binaud) each had a tubercular family history. Case 29 (Demme), Case 48 (Ohnacker), Cases 53 and 54 (Piskacek), Cases 62 and 65 (Berchtold), and Case 78 (Bartels) all presented a tubercular history in the immediate family.

The existence of tuberculosis in the immediate family of any patient must be given its due weight in doubtful cases of breast tumor.

THE AGE. The majority of all the cases were thirty-five years old or younger. A number were under twenty years of age. The oldest case recorded was but fifty-three years. Mammary tuberculosis occurs in comparatively young adults—*i. e.*, during the period of functional activity of the gland.

ADDITIONAL TUBERCULAR FOCI. In many cases the facies of the patient was evidently tubercular. The well-recognized "scrofulous" diathesis was present, and, in addition, tubercular infection already existed in many different tissues remote from the mammary gland, the breast lesion being only one of two tubercular lesions in the same individual. The lymphatic glands of the neck, the bones of the elbow-joint, of the sternum and the ribs, the apices of the lungs, the epididymis, the sacro-iliac synchondrosis, the pleura, and the peritoneum, all manifested tubercular lesions.

PREVIOUS CONDITION OF THE BREAST. About half the cases had borne children, and the breasts of these women had been functionally active. About ten of the cases were reported to have had an inflammation of the breast at some time previous to the appearance of the tubercular infection.

Lactation was active during the development of the tubercular disease only a few times. Does an inflammation of the breast during the puerperal period predispose to a tuberculosis of the breast? In a series of 17,999 well-observed cases at the Boston Lying-in Hospital,¹ there were 92 cases of abscess of the breast. This is a low percentage of one-half of one per cent. It is not known, of course, that all these cases were free from tuberculosis.

In the cases here recorded there is over 13 per cent. of mastitis; that is, in the tubercular puerperal cases there is a greater frequency of abscess than in the normal puerperal cases. It may be that the tubercular infection finds a soil more favorable to its development in a breast once the seat of an inflammatory process. The percentage at the Boston Lying-in Hospital must not be taken as expressing the frequency of mastitis, for these cases are under observation there but a short time, and may develop after that period.

Inoculation experiments were successful in nine of the reported cases. Intraperitoneal inoculation of guinea-pigs was done in all but one case, in which inoculation into the eye of a rabbit was successfully tried.

Series of Cases in which Inoculation Experiments were made Successfully.

- Case 5. Villar.
- Cases 25, 26, and 27. Gaudier and Peraire.
- Case 28. Sabrazes and Binaud.
- Case 30. Ugo Pisani.
- Case 49. Ohnacker.
- Case 62. Berchtold.
- Case 65. Berchtold.

In 3 of the 9 cases in which the inoculation was positive, no bacilli were discovered in the abscesses or breast tumor.

It is merely an interesting fact, in passing, to note that 4 of the tuberculous cases were men, and that 2 of the rejected cases were also men. These are the male cases of the accepted list:

- Case 20. Porier.
- Case 21. Hebb.
- Case 22. Schede.
- Case 29. Demme.

These are the 2 male cases of the rejected list:

- Case 19. Horteloupe.
- Case 40. Heyfelder.

¹ These statistics were furnished through the courtesy of Dr. Edward Reynolds, Boston Lying-in Hospital.

SUBJECTIVE EVIDENCES OF THE DISEASE. In about half of the cases reported *pain* in the breast is mentioned as an early and constant sign. In a few cases the pain was stated as severe. In the case reported by the writer, in which there was no acute inflammatory process at the time examined, the patient came seeking relief not so much from the discharging fistula as from the persistent pain in the breast.

In a large number of cases the disease is discovered by the patient when already well established. It offers no warning and proceeds in a quiet and peculiarly stealthy fashion.

The breast itself, often small and insignificant in advanced cases, at the beginning of the disease may be found enlarged, independently of the presence of an abscess or definitely defined tumor. This enlargement is due to the very great round-cell infiltration, giving an indurated, brawny feel to the part of the breast involved.

The nipple was retracted in only a few of the cases reported.

The tubercular process has appeared in the breast in variable forms, from a single small node or many nodules, firm in consistency, resembling lymph glands, seated in the periphery or scattered through the breast, to a hard, irregular, ill-defined lumpy mass the size of an orange in the centre of the breast gland. There are many gradations. These masses may be movable in or fixed to the breast gland. They may be immovably fixed to the pectoral fascia. The skin over these masses is usually unattached. These masses may extend well outside the mammary gland toward and even to and into the axilla of the same side.

As the tubercular process progresses these masses become somewhat less well-defined, their outlines are more indistinct; they seem attached to the contiguous tissues. There is a doughy, indefinable feel upon palpation. Still later in the evolution of the tubercular process, here and there throughout the presenting tumor, there is a softness felt; fluctuation is present. The skin is attached to some part of the softened area, the skin becomes red, ulcerates, and through the resulting sinus appears a discharge of pus and of a puriform caseous material.

It is interesting that in the majority of instances the masses in the breast which softened first did so near to the nipple. If suppuration in tubercular lesions necessitates the introduction of an infectious agent other than the tubercle bacillus, it would seem that the nipple afforded an easy entrance to the pyogenic coccus.

THE PROGRESS OF THE DISEASE. The tubercular process was characteristically a slow one in almost all instances. It occupied months and even years in its course from the time it was first noticed by the patient to the time that the disease was examined by the physician.

In the writer's case five years was the duration of the disease. Mandry (Case 14) reports a case of four years' duration.

In the following four cases the course of the disease is reported as

having been very rapid: Case 9, Habermaas (by Mandry). Case 12, Mandry. Case 21, Hebb. Case 31, Lane.

Case 31 was not proved to be tubercular. Cases 9, 12, and 21 may have had a secondary infection, therefore the rapidity of their progress.

FISTULA. In more than half the cases a fistula was present. A few cases showed fistulæ in the axilla. Multiple fistulæ were found in several instances. The openings of the fistulous tracts appear as ulcers with undermined bluish edges filled with pale, flabby granulations from which a thin puriform caseous discharge proceeds.

AXILLARY LYMPHATICS. In nearly all cases the axillary glands presented different stages of tuberculosis. They were at times hard or softened, small or large, and fistulæ were present from these axillary glands with the characteristic openings.

In so many instances the enlargement of the glands of the axilla preceded the manifestation of the disease in the breast that it is reasonable to suppose that it was primary in the axilla. This was very evident in Case 75 (Reverdin).

CAUSES OF DEATH. Few cases have been followed carefully until death.

In those reported as having died, Case 3 (Powers) died of phthisis four years later. Case 8 (Habermaas, quoted by Mandry) died of tubercular peritonitis. Case 16 (Billroth) died of tuberculosis, presumably miliary. Case 51 (Orthmann) died of tubercular pleurisy and pericarditis.

TUBERCLE BACILLI. In 29 cases the tubercle bacilli were found. Ugo Pisani reports them in the pus from the abscess. Orthmann reports them as in the axillary glands. Piskacek reports them as in the pus of fistulæ. Roux and Hering report them as in the mammary gland and the axillary glands. Davis reports them as found, in his first case, in the tissues. *Microscopically*, the reported cases show the anatomical tubercle with characteristic giant-cells in the axillary glands, in the walls of abscess-cavities, in the acini of glands, in the walls of fistulæ, and in the new connective tissue. In a few instances macroscopic miliary tubercles were seen. In all instances the round-cell infiltration is very great. The breast tissue is found cirrhotic and often has nearly disappeared. The bloodvessels show an endarteritis. In many cases the bloodvessels are few in number (Bender and Poirier). The pectoral fascia and muscle are found involved in the tubercular process. From the evidence of the reported cases, carefully considered, it would seem highly probable that the occurrence of a purely primary tuberculosis of the mammary gland is extremely rare.

The so-called case of primary tuberculosis is secondary to a tubercular lesion in some other part of the body, if not due to contiguity of tuberculous tissue.

Spediacci, *Schmidt's Jahrb.*, vol. cexlvii., p. 148, 1895, from his experiments with the inoculation of guinea-pigs and rabbits, suggests that all tuberculosis of the mammary gland is secondary.

DIAGNOSIS. From the ordinary *pyogenic infections* tuberculosis may be distinguished by the absence of a sudden onset and acute inflammatory symptoms.

When the breast tumor is hard or firm other solid tumors must be considered, and the diagnosis is often difficult. From *carcinoma* of the breast tuberculosis is distinguished by the less isolated and softer feel of tuberculosis; tuberculosis occurs in younger patients; the axillary glands of tubercular subjects are involved early; in *carcinoma* the axillary glands are usually enlarged late in the disease. The firmness or extreme hardness of *carcinoma* is very characteristic; tuberculosis very rarely attains such board-like hardness. If present, the cachexia of the two diseases is very different. The clinical picture of tuberculosis is quite different in its details from that of *carcinoma*.

The *gummata of syphilis* may be distinguished from tuberculosis by the specific history and the positive results of antisyphilitic treatment.

After softening of the tubercular tumor, whether in whole or in part, the diagnosis is attended with less difficulty. *Actinomyces* of the breast is to be distinguished from a tubercular cold abscess and chronic fistulæ. The discovery of the actinomycetes by the gross and microscopical appearances will make the diagnosis certain.

From *cysts* of the breast, the fluctuating tubercular tumors may easily be differentiated in that the breast-cysts are usually tense and firm. There is no inflammatory exudate about the breast-cysts, so that they are clearly defined, whereas the fluctuating swellings of tuberculosis are softer and often ill-defined.

As a help to diagnosis, Roswell Park¹ suggests that the discharge from the fistulous tract, the fluid from the fluctuating swelling, should be examined microscopically; if tubercular, it will show a lack of the granular débris and formed elements. The same discharge should be stained for tubercle bacilli. A guinea-pig should be inoculated with the suspected fluid. The inoculation-test will be final and satisfactory even when the microscopical examination proves to be negative. A bit of solid tissue may be removed and examined histologically and may be used for inoculation experiments. It is of value in this connection that in a case reported by Davis (82) tubercle bacilli were found in the discharge from the nipple previous to operation.

PROGNOSIS. The prognosis as to local recurrence and complete recovery after thorough removal of the breast and axilla and all glands is, of course, dubious in distinctly tubercular subjects and those in

¹ Surgery, by American Authors,

whom the mammary lesion is evidently due to auto-infection. On the other hand, in apparently healthy subjects, with few or small axillary glands (the disease appearing to be primary in the breast), the prognosis both as to local conditions and complete recovery of health is excellent.

TREATMENT. The following have been the methods of treatment in the reported cases:

1. Curetting of sinuses.
2. Cauterization of sinuses.
3. Removal of the tumor from the breast.
4. Removal of the breast and the tumor.
5. Removal of the axillary glands.
6. Removal of the breast and axillary glands.

Complete removal of all disease, including the whole breast and all the glandular contents of the axilla, is the only thorough treatment advisable.

It is possible to imagine a tubercular focus lying isolated in the breast-tissue which can be removed completely without sacrificing the gland itself. Practical experience proves, however, that partial operations are dangerous.

The old method of curetting tubercular abscesses and chronic fistulæ of the breast, in the hope of their healing, has been discarded. A better understanding of the pathological conditions present in the abscess-wall has changed this treatment to radical excision of all the disease with a wide margin. The wide margin is necessary, for tuberculosis extends further into surrounding tissues than can be seen with the naked eye.

In addition to operative procedure, the general constitutional and climatic treatment should be followed as in cases of tuberculosis in other parts of the body.